Fact Sheet

NPDES Permit Number: WA-002442-2

Public Comment Start Date: December 2, 2005
Public Comment Expiration Date: January 3, 2006

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Proposed Reissuance of a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA)

Swinomish Reservation Sewer District
Shelter Bay Waste Water Treatment Plant

EPA proposes to Reissue the NPDES permit for the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:

- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions for the facility
- a map and description of the discharge location
- technical material supporting the conditions in the permit

Public Comment
Persons wishing to comment on, or request a Public Hearing for the draft permit for this facility may do so in writing by the expiration date of the Public Comment period. A request for a Public Hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for Public Hearings must be in writing and should be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

After the Public Notice expires, and all comments have been considered, EPA's regional Director for the Office of Water and Watersheds will make a final decision regarding permit issuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments prior to any decision to issue the permit. The permit will become effective 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days.

Documents are Available for Review
The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday at the address below. The draft permits, fact sheet, and other information can also be found by visiting the Region 10 NPDES website at "http://epa.gov/r10earth/waterpermits.htm."

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FACT SHEET FOR NPDES PERMIT WA-002442-2

Shelter Bay Community, Inc.

SUMMARY

The Environmental Protection Agency (EPA) proposes to revise and administer the NPDES Permit for the Shelter Bay Waste Water Treatment Plant (WWTP) with review and assistance by the Swinomish Indian Tribal Community (SITC). The Washington Department of Ecology will also have the opportunity to review the draft permit. This arrangement allows the Swinomish to move towards administering the Federal Clean Water Act on SITC lands and allows mutual cooperative efforts for all three parties to protect the waters of Puget Sound for the beneficial use of all.

The Shelter Bay Community wastewater treatment plant is an NPDES minor facility treating domestic sewage from residences located within the Swinomish Reservation on land leased to residents of the Shelter Bay Community. No industrial waste water will be discharged to the sewage treatment plant under current zoning by the SITC government. The treatment plant provides secondary (biological) treatment of wastewater using an oxidation ditch, settling basins, and chlorine disinfection. Effluent is discharged to the Swinomish Channel through a submerged diffuser.

The wastewater constituents of concern are 5-day biochemical oxygen demand (BOD_5), suspended solids, fecal coliform bacteria, and chlorine. These pollutants are limited in the permit to levels that meet technology-based and water quality-based requirements. Shelter Bay wastewater treatment plant was required to meet new water quality-based limits for chlorine within three years of the last permit issuance. Since ammonia was a concern, more data were required in order to determine if permit limitations for ammonia were necessary. Ammonia levels as well as trace levels of heavy metals and other pollutants are present in the effluent, however, the discharge does not have a reasonable potential to exceed Washington state water quality standards and limits are no necessary for these parameters. These findings are consistent with wastewater generated solely by households.

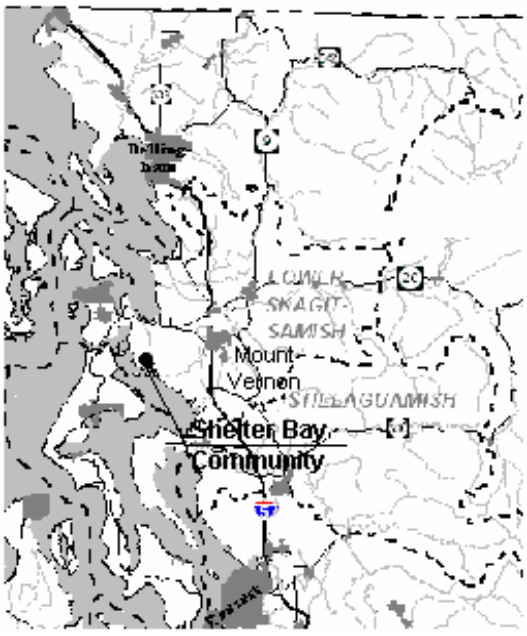

Figure 1: Vicinity map showing the location of the Shelter Bay Community near the Town of LaConner in Skagit County, Washington. Discharge goes to the Swinomish Channel.

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II. INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA may delegate responsibility to administer the NPDES permit program to the states and tribal authorities.

EPA is responsible for the administrative procedures for issuing and enforcing this permit since it is located on tribal community land and the Swinomish Tribe does not have NPDES authority. EPA is the "Permit Administrator" referred to in the permit at the time this permit is issued.

Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (40 CFR 124.10). Notice to the public that the permit is proposed for issue will be published in the Skagit Valley Herald. The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures). Errors and omissions identified in this review have been corrected before going to public notice.

GENERAL INFORMATION	
Applicant & Mailing Address	Shelter Bay Community, Inc., Box A, LaConner, WA 98257
Facility Name and Location	Shelter Bay Tribal Sewer District, 101 Samish Place, La Conner, WA (Located on Swinomish Indian Tribal Community lands across the Swinomish Channel from LaConner)
Responsible Official	Judy Grosvenor – Community Manager (360) 466-3805 fax (360) 466-4733
Facility Contacts	Robert B. Connolly – Public Works Supervisor (360) 202-2391
Type of Treatment:	Secondary Biological Treatment: Activated Sludge process, oxidation ditches
Discharge Location	Swinomish Channel Latitude: 48° 23' 12" N Longitude: 122° 30' 16" W.

III. BACKGROUND INFORMATION

A. DESCRIPTION OF THE FACILITY

History

The Shelter Bay Community wastewater treatment plant (WWTP) was originally constructed in the early 1970's with a design flow of 60,000 gallons per day (gpd). The plant expanded to a design flow of 100,000 gpd (average daily flow for the maximum month) in 1984. The last expansion was undertaken in 1994 to increase the design flow to 227,000 gpd. The plant is designed to meet secondary biological treatment standards as required by federal regulations.

The service area for this WWTP is fixed to a maximum build out of 932 lots. The Shelter Bay Community operates on land leased to the year 2044 from the SITC, so the lease agreement fixes the size of the service area. The latest plant expansion was designed to provide adequate capacity to treat wastewater generated on the ultimate build out of the leased lands. The estimated build out population is 2,500 people. The plant receives no discharges from industrial sources and no industrial discharges are anticipated in the future because the SITC has not zoned any of the land in the service area for commercial or industrial use.

Collection System Status

The permit application lists the average daily flow rate during the year prior as 0.1169 million gallons per day (mgd), with the maximum daily flow rate as 0.2878 mgd. When compared to the designed flow rate of the waste water treatment plant of 0.2274 mgd, the average daily flow rate is approximately half of the design flow rate.

The permit application listed the estimated average inflow and infiltration into the treatment works as 1050 gallons per day. The permit application also states that beginning from September 2004, the WWTP will be instituting a three year plan to flush, clean and perform a visual/video collection system check.

Treatment Processes

This facility provides secondary treatment of domestic wastewater (sewage). Influent wastewater from households enters the plant through a barscreen and flows to an oxidation ditch. Influent is aerated and eaten by bacteria in the oxidation ditch for about one day. The ditch contents flow to a secondary clarifier where solids and the bacteria mass is settled, and the settled wastewater then flows to a chlorine contact chamber where it is mixed with chlorine and held for about an hour to destroy bacteria and pathogens. After a dechlorination process, the effluent flows through the outfall pipe to the Swinomish Channel for discharge. The settled solids and bacteria mass from the secondary clarifier are routed partly back to the oxidation ditch and partly “wasted” to a storage tank and are dewatered to produce raw sewage sludge. Sludge is hauled off of the SITC lands to a permitted facility in Washington State for additional treatment and disposal. Currently the sludge is hauled to the Soil Key facility in Tenino, Washington for composting and/or disposal. The plant process diagram is shown in figure 3.

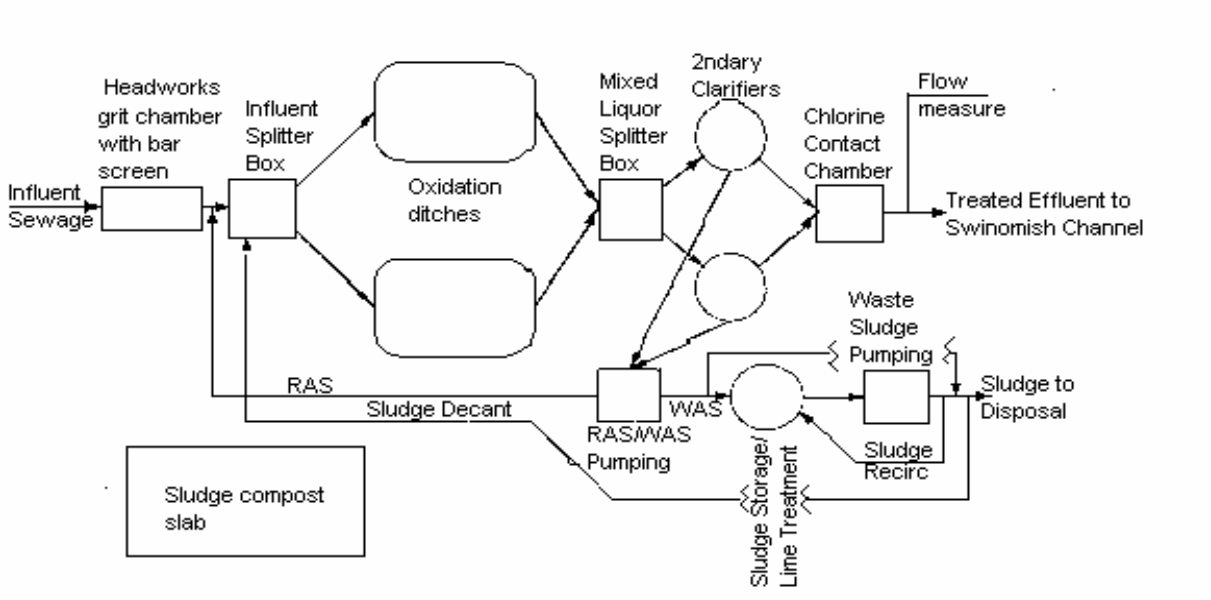

Figure 2: Shelter Bay WWTP process schematic.

Discharge Outfall

Secondary treated and disinfected effluent is discharged from the facility via a submerged single port outfall pipe into the Swinomish Channel. The outfall is located about 200 from the shore at a depth of 13 feet. An outfall evaluation is required in the proposed permit (see VI.F.).

Residual Solids

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings), and at the secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Grit, rags, scum and screenings are drained and disposed of as solid waste at the local landfill. Solids removed from the secondary clarifier are hauled to another facility for treatment and disposal or may be treated with lime and land applied. The facility selects sludge disposal methods to minimize disposal costs. At the time this fact sheet is drafted, the facility is shipping sludge to the Soil Key facility for composting and/or disposal.

EPA Region 10 separates wastewater and sludge permitting. Under the CWA, EPA has the authority to issue separate sludge-only permits for the purposes of regulating biosolids. EPA may issue a sludge-only permit to each facility at a later date, as appropriate. Until future issuance of a sludge-only permit, sludge management and disposal activities at each facility continues to be subjected to the national sewage sludge standards at 40 CFR Part 503. The Part 503 regulations are self-implementing, which means that permittees must comply with them whether or not a permit has been issued.

B. PERMIT STATUS

The previous permit for this facility was issued on December 22, 1999 by and expired on December 22, 2004. The previous permit placed effluent limitations on 5-day Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), pH, Fecal Coliform bacteria, Interim Total Residual Chlorine (effective till September 30, 2002), and the Final Total Residual Chlorine limitations (effective after September 30, 2002).

An application for permit renewal was submitted to EPA in July, 2004.

C. SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

Review of monitoring and inspection reports show the facility to generally be in compliance with the conditions of the permit. On April 19th and 20th, 2004, EPA completed an NPDES Compliance Sampling Inspection. Except for Fecal Coliform Bacteria, all sample analysis results indicate that the waste water treatment plant was in compliance with their permit effluent limits at the time of the inspection.

In letters dated September 10th and 17th, 2002, from EPA to the Swinomish Indian Tribal Community, EPA cited violations in excess of chlorine limits allowed by the previous NPDES Permit. In a letter dated September 26, 2002 from the Swinomish Indian Tribal Community (SITC) to EPA, SITC believes that the cited chlorine levels previously reported were calculated in error, and the effluent levels were not in violation. SITC also reported that the waste water treatment plant had subsequently operated a de-chlorinator unit.

There are no other records of any other limits having been exceeded during the previous permitted period.

D. WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the NPDES application. The effluent is characterized in Table 1 for the period of April, 2003 through March, 2004:

Table 1: Wastewater Characterization for the Shelter Bay WWTP.

Parameter	Annual Average Daily Discharge	Maximum Daily Discharge	Average monthly Permit limit
BOD_5	1.11 mg/L	18 mg/L	30 mg/L 57 lb./day
TSS	0.728 mg/L	11 mg/L	30 mg/L 57 lb./day
Fecal Coliform Bacteria	6.05 CFU /100mL	128 CFU/100mL	200 CFU/100mL
Maximum Daily Values of pH ranges from 6.3 to 7.2 standard units			6.0 to 9.0

IV. PROPOSED PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133). Water quality-based limitations are based upon compliance with the Washington State Surface Water Quality Standards (Chapter 173-201A WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis and the limits necessary to meet the applicable rules and regulations for domestic wastewater treatment were determined and included in this permit. The EPA does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, they are not controllable at the source, they don't have a reasonable potential to cause a water quality violation, or because of any combination of these factors. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the permit administrator.

SITC currently has plans to develop Water Quality Standards. When these standards are approved by EPA, this permit may be modified based on applicable standards.

A. DESIGN CRITERIA

This facility is designed to treat specific quantities of flow and organic loading. Exceeding those criteria on a long term basis increases the risk of violating the effluent limits. In general, the plant should be operated at or below these design criteria to reliably comply with the limitations in the permit. The mass-based limitations are calculated based on the maximum monthly average design flow.

The design criteria for this treatment facility are taken from the plans and specifications prepared by Inca Engineers, Inc. and are as follows:

Table 2: Design Standards for Shelter Bay Community WWTP.

Parameter	Design Quantity
Maximum monthly average flow	0.2274 MGD
Average monthly flow	0.1836 MGD
Peak flow (daily assumed)	0.5685 MGD
BOD_5 influent loading	498 lb./day
TSS influent loading	498 lb./day
Design population	2,488

B. TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal (and state) regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133. These regulations are performance standards that constitute best available technology for treatment for municipal wastewater.

The following technology-based limits for pH, BOD_5, and TSS are taken from 40 CFR Part 133 except for fecal coliform bacteria and chlorine:

Table 3: Technology-based Limits.

Parameter	Limit
pH:	shall be within the range of 6.0 to 9.0 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
BOD_5 (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
Total residual chlorine	Average Monthly Limit = 0.5 mg/L Average Weekly Limit = 0.75 mg/L

The limitation for fecal coliform bacteria and chlorine are retained from the previous permit. The limitation for chlorine in the pervious permit is a technology-based standard limit derived from best professional judgement and from standard operating practices. The Water Pollution Control Federation's Chlorination of Wastewater (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/liter chlorine residual is maintained after fifteen minutes of contact time. See also Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal and Reuse, Third Edition, 1991. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/liter chlorine limit on a monthly average basis. Using the same proportionality between monthly average and weekly maximum as for BOD_5 and TSS, the corresponding weekly average is 0.75 mg/liter.

The following technology-based mass limits are based on 40 CFR Part 122.45 and 40 CFR Part 133.

Monthly average mass discharge limitation (lb./day) for TSS and BOD_5 are the maximum monthly design flow (0.2274 MGD) x Concentration limit (30 mg/l) x 8.34 (conversion factor) **= 57 lb./day**.

The weekly average effluent mass discharge limitation for TSS and BOD_5 are 1.5 x monthly loading of 57 lb. = **85 lb./day**.

Monthly average mass discharge limitation (lb./day) for chlorine is the maximum monthly design flow (0.2274 MGD) x Concentration limit (0.5 mg/l) x 8.34 (conversion factor) **= 0.95 lb./day**.

C. SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

The SITC does not have Tribal Water Quality Standards at this time. Lacking tribal standards, the State of Washington's Surface Water Quality Standards (Chapter 173-201A WAC) is used for evaluating and limiting the discharge of pollutants from this facility in this case. The SITC may promulgate its own water quality standards in the future. The state standards are consistent with federal guidance and have been approved by EPA. The state regulation is designed to protect the beneficial uses of the surface waters of the state. WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC) and the USEPA Quality Criteria for Water, 1986. They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. Most chemical standards are set with two values; one to protect aquatic life from short term lethal effects (acute standard) and the other to protect from long term health effects such as reduced growth or fecundity (chronic standard). When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used for permit limitations.

Numerical Criteria for the Protection of Human Health

The EPA has issued 91 numeric water quality criteria for the protection of human health, (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

Antidegradation

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

Critical Conditions

Surface water quality-based limits are derived for the water-body's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

Mixing Zones

The State Water Quality Standards allow the use of mixing zones around the point of discharge to comply with numerical water standards. A very limited acute zone is allowed to meet the acute standards (based one a one-hour exposure every three years) and a larger “chronic" mixing zone is allowed for meet the chronic standards (standards based on average four-day average concentration once every three years). The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone during the worst-case receiving water conditions. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

Description of the Receiving Water

The facility discharges to the Swinomish Channel which is designated as a Class A marine receiving water in the vicinity of the outfall. Other nearby point source outfalls include the discharge from the La Conner WWTP. Significant nearby non-point sources of pollutants include discharges from crop farms, dairy farms, and pleasure boats. Characteristic uses include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

Surface Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this receiving water are summarized below:

Fecal Coliform	14 organisms/100 ml maximum geometric mean & no more than 10% of samples in excess of 43 organisms/100 mL
Dissolved Oxygen	6 mg/l minimum
Temperature	16 degrees Celsius maximum or maximum incremental increases no greater than 0.3 degrees Celsius
pH	7.0 to 8.5 standard units
Turbidity	less than 5 NTUs above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

Consideration of Surface Water Quality-Based Limits for Numeric Criteria

Pollutant concentrations (e.g. chlorine, bacteria) in the proposed discharge exceed water quality criteria with technology-based controls. A previously authorized mixing zone is retained for this permit revision in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC. That zone is limited to a distance of 215 feet in any direction from the outfall terminus and the zone of acute criteria exceedance is limited to a distance of 22 feet from the outfall.

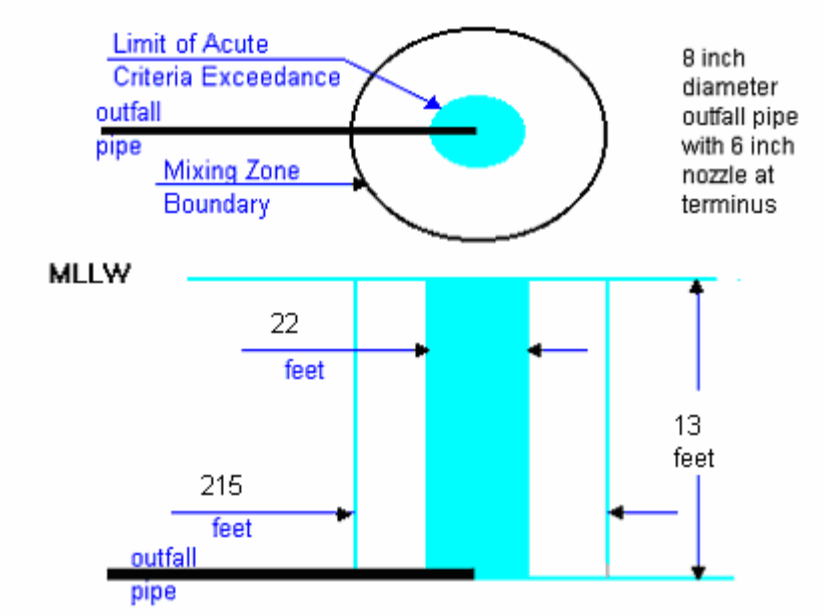

Figure 3: Schematic diagram of the mixing zone for Shelter Bay WWTP mixing zone.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of the EPA plumes model. The dilution factors have been determined to be (from Appendix C):

	Acute	Chronic
Aquatic Life	11:1	53:1
Human Health, Carcinogen		Not calculated use 53:1
Human Health, Non-carcinogen		Not calculated use 53:1

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

Temperature--The impact of the discharge on the temperature of the receiving water was modeled by simple mixing analysis at critical condition. If the receiving water temperature at the critical condition is 4^{o}C and the effluent temperature is 20^{o}C, then the predicted resultant temperature at the boundary of the chronic mixing zone is (53(4)+1(20))/54=4.29^{o}C and the incremental rise is 0.29^{o}C. Each of these assumed temperatures exceeds the actual extremes; the class A temperature change limit of 0.3^{o}C will be met under critical conditions. Therefore, no effluent limitation for temperature was placed in the proposed permit.

pH--Because of the high buffering capacity of marine water, compliance with the technology-based limits of 6 to 9 will assure compliance with the Water Quality Standards for Surface Waters.

Fecal coliform--The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 53:1. The resulting fecal coliform count would be 7 to 8 organisms per 100 ml. This value is one half of the standard. Data on fecal coliform bacteria levels in the Swinomish Channel are not available. Several other water bodies in the area are listed on the state 303d list for this parameter. The facility should provide for minimizing the discharge of bacteria in the effluent. The technology-based limitation provides for meeting the water quality standard unless the Swinomish Channel has average bacteria levels from other sources above about 7 per 100 ml.

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria of the previous permit is retained in the proposed permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential

for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

Prior to the latest plant upgrade, copper and lead were measured in the effluent at levels above the WQ standards (Jones & Stokes, 1992). In the previous permit, Cadmium, chromium, nickel, and zinc were measured at levels below the WQ standards. Mercury and silver were tested for, but not detected. A reasonable potential analysis using zero for background receiving water concentrations (See Appendix C) was conducted on copper, mercury, silver, and lead to determine whether more sampling or permit limitations should be required. The analysis showed that no limits or monitoring for these constituents were needed. This conclusion is supported by the annual sludge analysis for heavy metals – levels of metals in the sludge are at 10 to 20% of the maximum concentrations for meeting exceptional quality standards for sludge. There are no industrial users of the system, so it is not necessary for the current permit to contain effluent limitations for metals. Additional monitoring is not proposed.

Chlorine and ammonia are known to be present in the effluent. However, for the 12-month period from June 2004, to May 2005, the maximum effluent concentration of ammonia measured was 12.3 mg/l (measured in July 2004), and reasonable potential calculations showed no need for an effluent limitation. (The average monthly limit calculated for ammonia would be 30 mg/l, well above the measured value.) Effluent limits were derived for chlorine (and ammonia for informational purposes). The former permit provided a three year compliance schedule to meet the new chlorine limit. Quarterly ammonia monitoring will be required to obtain additional data on ammonia and to provide the facility with opportunity to adjust processes to reduce ammonia discharge to minimal practicable levels. Effluent limits were calculated using methods from EPA, 1991 as shown in Appendix C.

The resultant water quality-based effluent limits for chlorine are maximum daily limit of 0.14 mg/L and monthly average limit of 0.05 mg/l. The corresponding mass-based limitations are:

NPDES regulations found in 40 C.F.R. 122.45(f) require that mass limits be considered. The Monthly average mass limitation (lb./day) for chlorine is the maximum monthly design flow (0.2274 MGD) x Concentration limit (0.05 mg/l) x 8.34 (conversion factor) = **0.095 lb./day**.

The acute dilution, and therefore the daily maximum chorine limitation is based on an effluent flow volume of 0.42 MGD (the highest daily flow on record). The corresponding daily maximum chlorine limit would be this flow (0.42 MGD) x the concentration limit (0.14 mg/l) x 8.34 = 0.49 lb./day. This calculation is included for demonstration, only the concentration limit is included in the permit.

Far Field Pollutant

A pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water

quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

BOD_5-- BOD is a measure of the amount of oxygen demand in a discharge (see definition in Appendix B, Glossary). The demand is exerted by the breakdown of organic material by micro-organisms. The demand is therefore not exerted instantaneously, and the maximum impact on the receiving water body occurs some distance from the discharge. The impact and location of maximum impact are primarily a function of the BOD concentration, dilution, current velocity, and rate of oxygen demand.

Due to ample dilution in the marine environment, dissolved oxygen impacts generally occur only in circumstances in which an enclosed water-body (with limited circulation) is receiving very high BOD loadings. The relatively low flow and BOD concentration in this discharge, combined with ample dilution, indicate that dissolved oxygen impacts will be minimal with discharge at the technology based limit.

Whole Effluent Toxicity

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

Toxicity caused by unidentified pollutants is not expected in the effluent from this discharge. Toxicants known to be present (chlorine and ammonia) are limited or at levels low enough to not harm aquatic life. No commercial or industrial facilities discharge to this WWTP, so no toxic pollutants of unknown synergistic qualities should be introduced into the waste stream. Therefore, no whole effluent toxicity testing is required in this permit. The EPA may require effluent toxicity testing in the future if it receives information that toxicity may be present in this effluent.

Human Health

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

Based on the previous NPDES permit, the Washington State Department of Ecology had determined that the applicant's discharge does not contain chemicals of concern based on existing data or knowledge.

Sediment Quality

The Washington State Department of Ecology had promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. The EPA may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards to assure compliance with State water quality standards.

The Washington State Department of Ecology has previously determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards. No industrial dischargers are or will discharge to the WWTP. Secondary treatment removes settleable solids completely. The sludge monitoring data had previously shown that heavy metals in the sludge are at 10% to 20% of exceptional quality standards set in 40 CFR Part 503. These factors lead to the conclusion that marine sediment testing near the outfall is not justified.

Effluent Limitation Summary

Proposed limits are the same as the existing permit.

Table 4: Comparison of effluent limits with the existing permit issued December 22, 1999.

Parameter	Proposed Limits	Existing Limits
BOD_5	monthly average 30 mg/l, 57 lb./day weekly maximum 45 mg/l, 85 lb./day	monthly average 30 mg/l, 57 lb./day weekly maximum 45 mg/l, 85 lb./day
TSS	monthly average 30 mg/l, 57 lb./day weekly maximum 45 mg/l, 85 lb./day	monthly average 30 mg/l, 57 lb./day weekly maximum 45 mg/l, 85 lb./day
pH	shall be within the range of 6 to 9 standard units	shall be within the range of 6 to 9 standard units
Fecal Coliform Bacteria	monthly average 200/100 ml weekly maximum 400/100 ml	monthly average 200/100 ml weekly maximum 400/100 ml
Total Residual Chlorine	0.05 mg/l, 0.095 lb./day monthly average 0.14 mg/l daily maximum	0.05 mg/l, 0.095 lb./day monthly average 0.14 mg/l daily maximum

State Certification

Section 401 of the Clean Water Act requires EPA to certify before issuing a final permit. Since the discharge is from a facility located within the boundaries of the Swinomish Indian Tribal Community, the provisions of Section 401 of the Clean Water Act requiring state certification of the permit do not apply. Therefore, EPA will certify in accordance with Section 401.

V. MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring for ammonia as N is required to further characterize the effluent. This pollutant can be toxic directly to aquatic life and can also deplete dissolved oxygen levels in the Swinomish Channel. The Permittee should operate the plant to minimize the discharge of ammonia.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Sludge monitoring is required under 40 CFR 503.

The monitoring schedule is detailed in the proposed permit under Section I.B. ("Effluent Limitations and Monitoring"). Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with guidance given in the current version of Department's *Permit Writer's Manual* (July 1994) for treatment plants (RBC, Trickling filters, lagoons) of 0.1 to 0.5 MGD capacity for all parameters except fecal coliform. Fecal colifom monitoring is based on the Department's recommendations for oxidation ditches. The Department's guidance groups all oxidation ditches in with activated sludge systems of 0.5 to 2 MGD capacity. This plant has a capacity of 0.25 MGD, so the Department's guidance based on size of other systems was used for monitoring frequencies.

Additional monitoring is ammonia required in order to further characterize the effluent. These monitored pollutants could impact the quality of the surface water.

A. LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* This WWTP already meets this requirement and is included based on the authors BPJ as one means of assuring that data reported by the facility is reliable and accurate. The laboratory at this facility is accredited for: BOD5, TSS, pH, fecal coliform, and chlorine.

Accreditation for ammonia will not be required because this parameter is not limited.

VI. OTHER PERMIT CONDITIONS

A. REPORTING AND RECORDKEEPING

The conditions in Permit Section III ("Monitoring, Recording and Reporting Requirements") are based on the authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges.

B. PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant will increase the risk of violating permit limitations and exceeding the water quality standards. To prevent this from occurring, Permit Section IV.I. requires the Permittee to plan for expansions or modifications of the treatment works before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants.

C. OPERATION AND MAINTENANCE (O&M)

The proposed permit contains conditions in Section IV.E. ("Proper Operation and Maintenance"). It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

D. RESIDUAL SOLIDS HANDLING

For the 12-month period from June 2004 to May 2005, the sludge production at this facility is approximately 44 tons dry weight. Due to the addition of new homes and new equipment, sludge production is expected to increase by approximately 7% to 10% per year. The Permittee has conducted analysis of trace elements as required by 40 CFR 503. The Permittee is required to conduct this analysis once per year based on sludge production between 1 and 290 dry tons per year. The Permittee dewaters the sludge to 10 to 13 % solids and transports it to Soil Key facility in Tenino, Washington.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503. The disposal of other solid waste is under the jurisdiction of the Swinomish Health Authority.

EPA Region 10 separates wastewater and sludge permitting. EPA has authority under the CWA to issue separate sludge-only permits for the purposes of regulating biosolids. EPA may issue a sludge-only permit to each facility at a later date, as appropriate.

E. PRETREATMENT

This wastewater treatment facility has no industrial users, and treats only domestic wastewater. The entire service area is zoned for residential use, so no current land use provisions allow construction of either commercial or industrial users that would connect to the system. Therefore, the owner will not be required to investigate or control industrial users, or to initiate a pretreatment program. The permit forbids the connection of industrial or commercial users.

The permit prohibits the POTW from discharging or authorizing the discharge of certain types of waste into the sanitary sewer. The facility itself and its domestic users are prohibited from discharging wastes of these types to the sewer system. These prohibitions are taken directly from 40 CFR Part 403. The prohibitions are included to prevent pass through or interference, upset of the plant processes, damage to the collection or treatment system, and hazardous conditions for plant personnel and the public.

F. OUTFALL EVALUATION

Proposed permit condition in Section III.D. ("Additional Monitoring by Permittee") requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and nozzle and to determine if sediment is accumulating in the vicinity of the outfall. Proper function of the outfall is necessary for compliance with water quality-based effluent limitations.

G. GENERAL PROVISIONS

General Provisions found in Section V ("General Provisions") are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by U.S. EPA Region 10. These provisions include the following: Permit Actions; Duty to Reapply; Duty to Provide Information; Other Information; Signatory Requirements; Availability of Reports; Inspection and Entry; Transfers; and, State Laws.

H. ENDANGERED SPECIES ACT

On September 13, 2005, EPA wrote letters to the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to inquire what endangered species are present. The U.S. Fish and Wildlife Service responded with a website where the endangered species list can be found (see Appendix D). From the list, EPA determined that bald eagles might be present in the area of the discharge. Based on the determination of no Reasonable Potential for toxics in the effluent to exceed the water quality criteria, EPA believes that the bald eagles are not likely to be adversely impacted via the food chain or from incidental exposure to the receiving water. In addition, the outfall is submerged at 200 feet from the shoreline. Based on the above information, EPA believes that the discharge may impact, but is not likely to adversely impact endangered species in the area.

VII. PERMIT ISSUANCE PROCEDURES

A. PERMIT MODIFICATIONS

EPA may modify this permit to impose numerical limitations if necessary to meet Water Quality Standards or Sediment Quality Standards based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

EPA may also modify this permit as a result of new or amended or new water quality standards or federal regulations, including new SITC Water Quality Standards when approved by EPA.

B. RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The EPA proposes that this permit be issued for 5 years.

VIII. REFERENCES FOR TEXT AND APPENDICES

Anne Symonds & Associates in conjunction with Inca Engineers.

1991. Shelter Bay Engineering Report.

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

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1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Inca Engineers, Inc.

1992. Plans and Specifications for the Shelter Bay Tribal Sewer District.

Jones & Stokes Associates, Inc.

1992. Water Quality Evaluation for the Shelter Bay Wastewater Treatment Plant Expansion.

Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

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1994. Permit Writer's Manual. Publication Number 92-109

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

IX. APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The EPA has tentatively determined to issue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

The EPA will publish a Public Notice of Draft (PNOD) on December 2, 2005, in the Skagit Valley Herald, post the permit and fact sheet on the world wide web at: http://www.epa.gov/r10earth/offices/water/ow.htm, and directly notify individuals or groups who have expressed interest to allow the public access to the draft permit and fact sheet for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the EPA Region Office at the address listed listed below. Written comments should be mailed to:

Mr. Kai Shum
U.S. EPA Region 10 (OWW-130)
1200 Sixth Avenue
Seattle, WA 98101

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The EPA will hold a hearing if it determines there is a significant public interest in the draft permit. Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing.

The EPA will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The EPA's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

For further information, please contact Mr. Kai Shum of EPA Region 10 at (206) 553-0060 or by writing to the address listed above.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's life span or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Daily Discharge - means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the “daily discharge” is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the “daily discharge” is calculated as the average measurement of the pollutant over the day.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample-- is an individual sample collected over a period of time not exceeding 15 minutes.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of rainfall-caused surface water drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Method Detection Level (MDL) --- the minimum concentration of a substance (analyte) that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

Monthly Average --The average of the measured values obtained over a calendar month's time.

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)-- Industrial dischargers to a POTW that have effluent limitations defined in a category (40 CFR 403.6 and 40 CFR chapter I, subchapter N). However, the control authority may make a determination that even though an industrial user belongs to a category that has effluent limits for pretreatment, that industry is not a SIU because there is no reasonable potential for affecting the POTW's operation. A SIU may also be any other industrial user that: 1. discharges an average of 25,000 gallons per day or more of process water, 2. makes up more than 5 percent of the average hydraulic flow (dry weather) or 5 percent of the organic capacity of the plant, or 3. the control authority believes has a reasonable potential to adversely affect the POTW's operation.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

X. APPENDIX C--TECHNICAL CALCULATIONS

A. CHEMICAL POLLUTANTS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at http.www:wa.gov.ecology.

This spreadsheet calculates water quality based permit limits based on the two value steady state model using the State Water Quality standards contained in WAC 173-201A. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 99. (Last revision date 1-19-95).

Table 5: Permit limit calculations. Limits for chlorine apply. Other limits are calculated for informational purposes.

Permit Limit Calculation Summary

PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Concentration *mg/L*	Water Quality Standard Acute *mg/L*	Water Quality Standard Chronic *mg/L*	Average Monthly Limit (AML) mg/L	Maximum Daily Limit (MDL) mg/L	Comments
AMMONIA as mg/L of N -see seperate spreadsheet for saltwater fractions	11.00	53.00				5.50	0.83	**30.2**	**60.5**	based on 20 deg C, salinity 18 ppt,pH=8
CHLORINE in mg/L	11.00	53.00				0.013	0.008	**0.05**	**0.14**	

	Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit limit calculation			
	WLA Acute *mg/L*	WLA Chronic *mg/L*	LTA Acute *mg/L*	LTA Chronic *mg/L*	LTA Coeff. Var. (CV) *decimal*	LTA Prob'y Basis *Decimal*	Limiting LTA *mg/L*	Coeff. Var. (CV) *decimal*	AML Prob'y Basis *decimal*	MDL Prob'y Basis *decimal*	# of Samples per Month *n*
'AMMONIA	61	43.99	19.4	23.2	0.60	0.99	19.4	0.60	0.95	0.99	4.00
CHLORINE in mg/L	0.143	0.398	0.046	0.210	0.60	0.99	0.046	0.60	0.95	0.99	30.00

Table 6: Estimate of Reasonable Potential to exceed the water quality standards for the constituents listed. Note that for silver, the potential is based on the detection level of the analysis, the pollutant was not detected. This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56.

				State Water Quality Standard		Max concentration at edge of...			CALCULATIONS									
	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	LIMIT REQ'D?	Effluent percentile value		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	
Parameter	Acute	Chronic	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*			*Pn*	*ug/L*	*CV*	*s*	*n*				COMMENTS
AMMONIA as mg/L of N -see seperate spreadsheet for saltwater fractions				5.50	0.83	2.07	0.43	**NO**	0.95	0.22	6.00	0.60	0.55	2	3.79	11	53	based on 20 deg C, salinity 18 ppt,pH=8
COPPER - 7440508 6M Hardness dependent	0.83	0.83		4.80	3.10	3.27	0.68	**NO**	0.95	0.05	7.00	0.60	0.55	1	6.20	11	53	
CHLORINE				13	7.50	32.83	6.81	**YES**	0.95	0.90	300.00	0.60	0.55	30	1.20	11	53	
LEAD - 7439921 7M	0.951	0.95		210.00	8.10	10.72	2.22	**NO**	0.95	0.05	20.00	0.60	0.55	1	6.20	11	53	
MERCURY 7439976 8M	0.85			1.80	0.0250	0.10	0.02	**NO**	0.95	0.05	0.20	0.60	0.55	1	6.20	11	53	not detected, value set at detection level
MERCURY 7439976 8M (human health criteria)	0.85	0.85		100	0.15	0.10	0.02	**NO**	0.95	0.05	0.20	0.60	0.55	1	6.20	11	53	not detected, value set at detection level
SILVER - 7740224 11M	0.85			1.90	100	1.80	0.44	**NO**	0.95	0.55	10.00	0.60	0.55	5	2.32	11	53	not detected, value set at detection level
SILVER - 7740224 11M	0.85			1.90	100	4.79	1.17	**YES**	0.95	0.05	10.00	0.60	0.55	1	6.20	11	53	not detected, value set at detection level

Shaded criteria are dummy values used for calculation purposes. The standards list no value for the shaded entries. For the row labeled MERCURY (human health criteria), the comparison of the human health standard to the concentration at the edge of the mixing zone is a more stringent comparison than the calculations using average dilution and average plant flow used for the correct analysis of mercury concentration to the long term human health standard. Neither mercury nor silver were detected in the effluent for this one test. The potential need for a limit for silver is based on one non-detect sample - the concentration value used is the detection limit. Five similar results for measuring silver would eliminate the call for a limit. This calculation is inconclusive.

Calculation of WQ Criteria for Ammonia

Table 7: Spreadsheet for calculation of seawater fraction of unionized ammonia from Hampson (1977). Total ammonia criteria for salt water from EPA 440/5-88-004 and WAC-173-201A.

INPUT =========			
Temperature (deg C)	20.0	20.0	13.0
pH	8.0	7.0	8.0
Salinity (ppt)	18.0	18.0	20.0
Pressure (atm; EPA criteria assumes 1 atm)	1.0	1.0	1.0
OUTPUT ==========			
Molal Ionic Strength (results valid if between 0.35-0.85)	0.365	0.365	0.407
pKa8 (Whitfield model "B")	9.287	9.287	9.292
Percent of Total Ammonia Present as Unionized	3.46%	0.36%	2.06%
Unionized ammonia criteria (mg UINH3/L)			
Acute	0.233	0.233	0.233
Chronic	0.035	0.035	0.035
Total Ammonia Criteria (mg NH3 /L)			
Acute	6.7	65.3	11.3
Chronic	1.01	9.81	1.70
Total Ammonia Criteria (mg N /L)			
Acute	**5.5**	53.7	9.3
Chronic	**0.83**	8.06	1.40

Mixing Estimate

The amount of mixing provided within the dilution zone was estimated by the Department based on ambient data measured for and reported in a water quality study for this facility (Jones & Stokes Associates, Inc., 1992). That study assigned a larger mixing zone than is currently allowed under Washington state water quality standards. That conclusions of that study did not include Ecology policy that dilution is assumed to be reduced by 50% in estuaries where tidal currents reverse, such as the Swinomish channel. Current velocity data is based on best professional judgement of the author. The estimated velocity of 1 to 6 knots (0.51 to 3.1 M/sec) from the Jones & Stokes report seemed to be too high based on actual data from other locations. Values ranging from

0.05 M/sec to 1 M/sec were assumed. The outfall configuration was taken from construction plans submitted as part of the NPDES application. Receiving water density profiles were taken from Table 2 of the Jones & Stokes report.

The dilution factors calculated for the mixing zone and zone of acute criteria exceedance are summarized in Table 8. For compliance with the chronic standards at the edge of the mixing zone, the critical conditions are the average current velocity coupled with the critical ambient salinity and temperature in the receiving water. For evaluating compliance with water quality standards at the edge of the zone of acute criteria exceedance the critical conditions are the 10 percentile (slow) or 90 percentile (fast) current velocity coupled with the ambient density profile that yields the lowest dilution. These values were assumed and tested looking for reasonable worst case scenarios.

Dilution zone modeling was performed with Dilution Models for Effluent Discharges, 3rd edition and the computer programs (PLUMES interface) supplied by EPA with manual. Selection of critical conditions was done per the procedures prescribed in the Department of Ecology Permit Writer's Manual. Dilution factors were derived for acute aquatic toxicity and chronic aquatic. A summary of results from the various model scenarios, input conditions, and dilution factors are listed in the Table 8.

The WWTP outfall is 8-inch diameter pipe with a 6" reduction nozzle located at a depth of about 14 feet 200 feet from shore. Current is assumed to flow perpendicular to pipe end. Plant flows from the last four years and design flows are used to check how dilution changes as the flows through the WWTP increase.

Table 8: Summary of data, assumptions, PLUMES model outputs for dilution zone estimate.

SUMMARY				**Aquatic Life dilution factors**		**Acute**	**Chronic**
						11:1	**50:1**
max month design flow			0.23 MGD	Effluent temperature			
Max day design flow rate			0.57MGD	Range of 4 to 20 degrees C, use 17			
max month flow over last 4 years			0.17 MGD				
max daily flow - last 4 years			0.42 MGD	current velocity based on Jones & Stokes observations and BPJ			
Acute zone extends 6.52 M from outfall				Minimal = 0.05 m/sec			
Chronic zone extends 65.2 M from outfall				median = .50 m/sec			
				Maximum = 1.0 m/sec			
Case #	effluent flowrate (MGD)	effluent temp (F)	current speed (M/sec)	Stratification case from Jones & Stokes figure 2.	Comments	acute dilution	chronic dilution
1	0.42	17	1	14:10		35	
2	**0.42**	**17**	**0.05**	**14:10**	**Critical acute**	**22.8**	**40**
3	0.42	17	0.5	14:10		39	77
4	0.42	17	0.1	14:10		36	121
5	0.42	17	0.05	17:25		25	45
6	0.42	20	0.05	17:25		25	
7	0.42	4	0.05	17:25		25	45

8	0.42	17	1	17:25		40	573
9	0.42	17	3	17:25		24	350
10	0.17	17	0.05	14:10		27	51
11	**0.17**	**17**	**0.5**	**14:10**	**Critical chronic**	**50**	**106**
12	0.17	17	1	14:10			165
13	0.17	17	1	17:25			430
14	0.17	17	0.5	17:25			418
15	0.17	17	0.05	16:30		28	49
16	0.17	17	0.5	16:30			126
17	0.48	17	0.05	14:10	For future acute	22.8	
18	0.54	17	0.05	14:10	For future acute	22.6	
19	0.6	17	0.05	14:10	For future acute	22.5	
20	0.66	17	0.05	14:10	For future acute	22.5	
21	0.19	17	0.5	14:10	For chronic graph		102
22	0.21	17	0.5	14:10	For chronic graph		99
23	0.23	17	0.5	14:10	For chronic graph		95
24	0.25	17	0.5	14:10	For chronic graph		93
25	0.27	17	0.5	14:10	For chronic graph		90

The model runs that produced the minimum amounts of dilution are shown below. Case 2 is the critical case for acute dilution. Cases 17 through 20 (table 5)show that the acute dilution displays minimal variation over the range of flows predicted as the plant reaches design capacity. Critical conditions over a range of plant flows yields dilution factors of 23 to 22. The value of 22:1, reduced by half for tidal reflux (reversing currents) yields a final acute dilution factor of 11:1.

```
Jan 27, 1999,  14: 5:43  ERL-N PROGRAM PLUMES, Ed 3, 3/11/94  Case:   2 of  26
 Title   Shelter Bay WWTP acute                                        linear
  tot flow   # ports port flow   spacing  effl sal effl temp   far inc   far dis
   0.01827         1   0.01827      1000       0.0        17     6.523    19.569
  port dep  port dia plume dia total vel horiz vel vertl vel asp coeff print frq
     4.267    0.1524    0.1524     1.002     1.002     0.000      0.10       500
 port elev ver angle cont coef  effl den poll conc     decay  Froude # Roberts F
    0.3048       0.0       1.0  -1.16146       100         0     6.235     4.848
 hor angle red space p amb den p current   far dif   far vel K:vel/cur Stratif #
        90    1000.0   16.0837   0.02466    0.0003      0.05     40.61  0.007836
     depth   current   density  salinity      temp  amb conc  N (freq) red grav.
       0.0      0.05      12.3                                  0.09251    0.1693
         1      0.05      12.2                                buoy flux puff-ther
         2      0.05      13.2                                3.093E-06     1.637
         3      0.05      14.5                                jet-plume jet-cross
         5      0.01        17                                   0.8945     5.485
                                                              plu-cross jet-strat
                                                                  206.3     1.209
                                                              plu-strat
                                                                  1.406
                                                                hor dis>=

CORMIX1 flow category algorithm is turned off.
 19.569 m, 64.20 ft                                          >0.0 to any m range
Help: F1.  Quit: <esc>.  Configuration:ATNO0.  FILE: SHLTRBAY.VAR;
UM INITIAL DILUTION CALCULATION (linear mode)
 plume dep plume dia poll conc  dilution   hor dis
         m         m                          m
     4.267    0.1524     100.0     1.000     0.000
     2.505     1.369     7.589     12.98     2.959 -> trap level
     1.780     2.429     4.329     22.77     3.966 -> begin overlap
FARFIELD CALCULATION (based on Brooks, 1960, see guide)
Farfield dispersion based on wastefield width of      2.429m
   --4/3 Power Law--   -Const Eddy Diff-
      conc  dilution      conc  dilution  distance         Time
                                             m        sec   hrs
     4.326      22.8     4.326      22.8     6.523     51.15   0.0
     4.031      24.5     4.150      23.8     13.05     181.6   0.1
     3.471      28.5     3.814      25.9     19.57     312.1   0.1
```

Figure 4:Output of the Plumes model for the zone of acute dilution, zone is limited to 22 feet (6.52 M).

The Plumes output for critical conditions used for estimating the dilution at the edge of the mixing zone are shown in figure 7. Department policy recommends using the highest average monthly flow from the last three years as the flow on which to base the dilution; the dilution based on that flow is 106:1. The value of 106:1, reduced by half for tidal reflux (reversing currents) yields a final chronic dilution factor of 53:1. Dilution at the edge of the mixing zone varies with increasing effluent flow. Results for chronic dilution with increasing effluent flow (for future permit limit calculations) are graphed in figure 8.

```
Jan 27, 1999,  14: 6:10  ERL-N PROGRAM PLUMES, Ed 3, 3/11/94  Case:  11 of  26
 Title   Shelter Bay WWTP chronic                                        linear
  tot flow   # ports port flow   spacing  effl sal effl temp   far inc   far dis
  0.007448         1  0.007448      1000       0.0        17      6.52      65.2
  port dep  port dia plume dia total vel horiz vel vertl vel asp coeff print frq
     4.267    0.1524    0.1524    0.4083    0.4083     0.000      0.10       500
 port elev ver angle cont coef  effl den poll conc     decay  Froude # Roberts F
    0.3048       0.0       1.0  -1.16146       100         0     2.542      7872
 hor angle red space p amb den p current   far dif   far vel K:vel/cur Stratif #
        90    1000.0   16.0837    0.2149    0.0003       0.5     1.900  0.007836
     depth   current   density  salinity      temp  amb conc  N (freq) red grav.
       0.0       0.5      12.3                                  0.09251    0.1693
         1       0.5      12.2                                buoy flux puff-ther
         2       0.5      13.2                                1.261E-06    0.3243
         3       0.5      14.5                                jet-plume jet-cross
         5      0.05        17                                   0.3647    0.2566
                                                              plu-cross jet-strat
                                                                 0.1270    0.7721
                                                              plu-strat
                                                                  1.123
                                                                hor dis>=

CORMIX1 flow category algorithm is turned off.
 65.2 m, 213.9 ft                                          >0.0 to any m range
Help: F1.  Quit: <esc>.  Configuration:ATNO0.  FILE: SHLTRBAY.VAR;
UM INITIAL DILUTION CALCULATION (linear mode)
 plume dep plume dia poll conc  dilution   hor dis
         m         m                          m
     4.267    0.1524     100.0     1.000     0.000
     3.629    0.9746     3.125     31.49     2.930
     3.472     1.202     1.910     51.51     4.379 -> trap level
     3.283     1.611    0.9486     103.7     9.601
 -> local maximum rise or fall
FARFIELD CALCULATION (based on Brooks, 1960, see guide)
Farfield dispersion based on wastefield width of      1.611m
   --4/3 Power Law--   -Const Eddy Diff-
      conc  dilution      conc  dilution  distance         Time
                                             m        sec   hrs
    0.9468     103.9    0.9468     103.9     13.04     6.878   0.0
    0.9478     103.8    0.9478     103.8     19.56     19.92   0.0
    0.9482     103.8    0.9481     103.8     26.08     32.96   0.0
    0.9478     103.8    0.9480     103.8     32.60     46.00   0.0
    0.9457     104.1    0.9468     103.9     39.12     59.04   0.0
    0.9410     104.6    0.9441     104.2     45.64     72.08   0.0
    0.9337     105.4    0.9397     104.7     52.16     85.12   0.0
    0.9241     106.5    0.9339     105.4     58.68     98.16   0.0
    0.9123     107.9    0.9269     106.2     65.20     111.2   0.0
```

Figure 5: Output of the Plumes model for the chronic dilution zone, zone is limited to 215 feet (65.2 M).

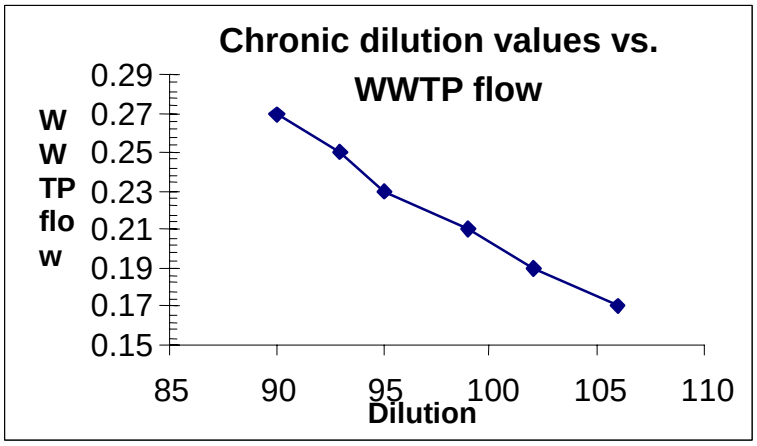

Figure 6: Graph of chronic dilution as a function of flow. As treatment plant discharge volume increases in the future, the permitting administrator should reevaluate the chronic dilution factor and compliance with chronic water quality standards at the edge of the mixing zone.

XI. APPENDIX D—ENDANGERED SPECIES LIST from the U.S. Fish and Wildlife Service website for Skagit County:

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN IN WESTERN WASHINGTON
AS PREPARED BY
THE U.S. FISH AND WILDLIFE SERVICE
WESTERN WASHINGTON FISH AND WILDLIFE OFFICE

(Revised October 8, 2004)

SKAGIT COUNTY

LISTED

Wintering bald eagles (*Haliaeetus leucocephalus*) occur in the county from about October 31 through March 31.

There are 25 bald eagle communal winter night roosts located in the county.

There are 11 bald eagle wintering concentrations located in the county in the following areas: Fidalgo Island; Guemes Island; Skagit River-S. Fork Nooksack River; Skagit River; Skagit-Sauk Rivers; Corkindale Staging Area; Illabot Creek Staging Areas; and Samish Bay.

There are 77 bald eagle nesting territories located in the county. Nesting activities occur from about January 1 through August 15.

Bull trout (*Salvelinus confluentus*) occur in the county.

Canada lynx (*Lynx canadensis*) may occur in the county.

Gray wolves (*Canis lupus*) may occur in the county.

Grizzly bears (*Ursus arctos = U. a. horribilis*) may occur in the county.

Marbled murrelets (*Brachyramphus marmoratus*) occur in the county. Nesting murrelets occur from April 1 through September 15.

Northern spotted owls (*Strix occidentalis caurina*) occur in the county throughout the year.

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Castilleja levisecta (golden paintbrush) may occur in the county.

Major concerns that should be addressed in your Biological Assessment for this listed plant species include:

1. Distribution of taxon in project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and habitat loss.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for the northern spotted owl has been designated in Skagit County.

Critical habitat for the marbled murrelet has been designated in Skagit County.

PROPOSED

Critical habitat for the bull trout (Coastal-Puget Sound distinct population segment) has been proposed in Skagit County.

CANDIDATE

Fisher (*Martes pennanti*) (West Coast distinct population segment)
Oregon spotted frog (*Rana pretiosa*)

SPECIES OF CONCERN

California wolverine (*Gulo gulo luteus*)
Cascades frog (*Rana cascadae*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)

Olive-sided flycatcher (*Contopus cooperi*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresi*)
Tailed frog (*Ascaphus truei*)
Western toad (*Bufo boreas*